

# Universiteit van Pretoria Jaarboek 2017

## BScHons Finansiële Ingenieurswese (02240277)

**Duur van studie** 1 jaar

**Totale krediete** 135

### Programinligting

*Hierdie inligting is slegs in Engels beskikbaar*

#### Renewal of registration

1. Subject to exceptions approved by the Dean, on the recommendation of the head of department, and in the case of distance education where the Dean formulates the stipulations that will apply, a student may not sit for an examination for the honours degree more than twice in the same module.
2. A student for an honours degree must complete his or her study, in the case of full-time students, within two years and, in the case of after-hours students, within three years of first registering for the degree and, in the case of distance education students, within the period stipulated by the Dean. Under special circumstances, the Dean, on the recommendation of the head of department, may give approval for a limited extension of this period.

In calculating marks, General Regulation G.12.2 applies.

Apart from the prescribed coursework, a research project is an integral part of the study.

### Toelatingsvereistes

'n Toepaslike baccalaureus-graad met 'n minimum van 60% vir alle modules op derde vlak. In die keuringsprosedure die kandidaat "se volledige voorgraadse akademiese rekord sal oorweeg word. In die besonder, is dit nodig dat die kandidaat voltooi het Calculus, Differentiaalvergelykings en Lineêre algebra op tweedejaarsvlak (elk met 'n punt van minstens 60%).

### Bevordering tot volgende studiejaar

Hierdie inligting is slegs in Engels beskikbaar.

The progress of all honours candidates is monitored biannually by the postgraduate coordinator/head of department. A candidate's study may be terminated if the progress is unsatisfactory or if the candidate is unable to finish his/her studies during the prescribed period.

### Slaag met lof

The BScHons degree is awarded with distinction to a candidate who obtains a weighted average of at least 75% in all the prescribed modules and a minimum of 65% in any one module.



## Kurrikulum: Finale jaar

**Minimum krediete: 135**

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Core credits: 91

Elective credits: 44

**The Postgraduate Coordinator has to approve the final programme composition for this programme.**

1. Students who have included Statistics, Mathematical Statistics or Industrial Engineering in their undergraduate degree programme, will not be allowed to take BAN 780. Additional modules from the list of electives should be included in the programme composition.
2. Lectures for BAN 780 and ISE 780 are scheduled in “blocks” – consult the relevant departments at the Faculty of Engineering, Built Environment and Information Technology.
3. WTW 732 and WTW 762 will be presented weekly as well as some extra “block” lectures.
4. TRA 720 not allowed for students who have already passed the UP module WST 321 (or equivalent) at undergraduate level.

## Kernmodules

### Bedryfsanalise 780 (BAN 780)

**Modulekrediete** 16.00

**Diensmodules** Fakulteit Natuur- en Landbouwetenskappe

**Voorvereistes** Nie vir Bedryfsingenieurswese studente nie

**Kontaktyd** 24 kontakure per semester

**Onderrigtaal** Module word in Engels aangebied

**Akademiese organisasie** Bedryfs- en Sisteemingenieursw

**Aanbiedingstydperk** Semester 1 of Semester 2

#### Module-inhoud

\* Hierdie inligting is slegs in Engels beskikbaar.

- Monte Carlo Simulation
- Continuous Simulation
- System Dynamics
- Multi-objective Decision-making
- Operations Research
- Decision Analysis
- Discrete Simulation

### Wiskundige modelle van finansiële ingenieurswese 732 (WTW 732)

**Modulekrediete** 15.00

**Voorvereistes** Geen voorvereistes.



<b>Kontaktyd</b>	2 lesings per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Wiskunde en Toegepaste Wisk
<b>Aanbiedingstydperk</b>	Semester 1

#### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

Introduction to markets and instruments. Futures and options trading strategies, exotic options, arbitrage relationships, binomial option pricing method, mean variance hedging, volatility and the Greeks, volatility smiles, Black-Scholes PDE and solutions, derivative disasters.

### Projek 792 (WTW 792)

<b>Modulekrediete</b>	30.00
<b>Voorvereistes</b>	Geen voorvereistes.
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Wiskunde en Toegepaste Wisk
<b>Aanbiedingstydperk</b>	Jaar

#### Module-inhoud

Raadpleeg Departement.

### Wiskundige optimalisering 750 (WTW 750)

<b>Modulekrediete</b>	15.00
<b>Voorvereistes</b>	Meervariant-Calculus op 2de-jaarsvlak; Lineêre Algebra op 2de-jaarsvlak
<b>Kontaktyd</b>	2 lesings per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Wiskunde en Toegepaste Wisk
<b>Aanbiedingstydperk</b>	Semester 1

#### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

Classical optimisation: Necessary and sufficient conditions for local minima. Equality constraints and Lagrange multipliers. Inequality constraints and the Kuhn-Tucker conditions. Application of saddle point theorems to the solutions of the dual problem. One-dimensional search techniques. Gradient methods for unconstrained optimisation. Quadratically terminating search algorithms. The conjugate gradient method. Fletcher-Reeves. Second order variable metric methods: DFP and BFGS. Boundary following and penalty function methods for constrained problems. Modern multiplier methods and sequential quadratic programming methods. Practical design optimisation project.

### Wiskundige modelle van finansiële ingenieurswese 762 (WTW 762)

<b>Modulekrediete</b>	15.00
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<b>Voorvereistes</b>	WTW 732 of WTW 364
<b>Kontaktyd</b>	2 lesings per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Wiskunde en Toegepaste Wisk
<b>Aanbiedingstydperk</b>	Semester 2

### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

Exotic options, arbitrage relationships, Black-Scholes PDE and solutions, hedging and the Miller-Modigliani theory, static hedging, numerical methods, interest rate derivatives, BDT model, Vasicek and Hull-White models, complete markets, stochastic differential equations, equivalent Martingale measures.

## Keusemodules

### Tydreeksanalise 720 (TRA 720)

<b>Modulekrediete</b>	15.00
<b>Diensmodules</b>	Fakulteit Natuur- en Landbouwetenskappe
<b>Voorvereistes</b>	STK 310 en STK 320
<b>Kontaktyd</b>	1 lesing per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Statistiek
<b>Aanbiedingstydperk</b>	Semester 2

### Module-inhoud

\*Verwys na die Engelse weergawe van die Course Catalogue.

### Meerveranderlike analise 720 (MVA 720)

<b>Modulekrediete</b>	15.00
<b>Diensmodules</b>	Fakulteit Natuur- en Landbouwetenskappe
<b>Voorvereistes</b>	MVA 710
<b>Kontaktyd</b>	1 lesing per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Statistiek
<b>Aanbiedingstydperk</b>	Semester 2

### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

The matrix normal distribution, correlation structures and inference of covariance matrices. Discriminant analysis. Principal component analysis. The biplot. Multidimensional scaling. Exploratory factor analysis. Confirmatory Factor analysis and structural equation models.



## Numeriese analise 733 (WTW 733)

<b>Modulekrediete</b>	15.00
<b>Voorvereistes</b>	Geen voorvereistes.
<b>Kontaktyd</b>	2 lesings per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Wiskunde en Toegepaste Wisk
<b>Aanbiedingstydperk</b>	Semester 1

### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

An analysis as well as an implementation (including computer programs) of methods are covered. Numerical linear algebra: Direct and iterative methods for linear systems and matrix eigenvalue problems: Iterative methods for nonlinear systems of equations. Finite difference method for partial differential equations: Linear elliptic, parabolic, hyperbolic and eigenvalue problems. Introduction to nonlinear problems. Numerical stability, error estimates and convergence are dealt with.

## Lineêre modelle 710 (LMO 710)

<b>Modulekrediete</b>	15.00
<b>Diensmodules</b>	Fakulteit Natuur- en Landbouwetenskappe
<b>Voorvereistes</b>	WST 311, WST 312, WST 321 en WST 322
<b>Kontaktyd</b>	1 lesing per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Statistiek
<b>Aanbiedingstydperk</b>	Semester 1

### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

Projection matrices and sums of squares of linear sets. Estimation and the Gauss-Markov theorem. Generalised t- and F- tests.

## Lineêre modelle 720 (LMO 720)

<b>Modulekrediete</b>	15.00
<b>Diensmodules</b>	Fakulteit Natuur- en Landbouwetenskappe
<b>Voorvereistes</b>	LMO 710
<b>Kontaktyd</b>	1 lesing per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Statistiek
<b>Aanbiedingstydperk</b>	Semester 2



## Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

The singular normal distribution. Distributions of quadratic forms. The general linear model. Multiple comparisons. Analysis of covariance. Generalised linear models. Analysis of categorical data.

## Meerveranderlike analise 710 (MVA 710)

**Modulekrediete** 15.00

**Diensmodules** Fakulteit Gesondheidswetenskappe

**Voorvereistes** WST 311, WST 312, WST 321 en WST 322

**Kontaktyd** 1 lesing per week

**Onderrigtaal** Module word in Engels aangebied

**Akademiese organisasie** Statistiek

**Aanbiedingstydperk** Semester 1

## Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

Matrix algebra. Some multivariate measures. Visualising multivariate data. Multivariate distributions. Samples from multivariate normal populations. The Wishart distribution. Hotelling's  $T^2$  statistic. Inferences about mean vectors.

## Moderne portefeuljeteorie 712 (WTW 712)

**Modulekrediete** 15.00

**Voorvereistes** Registrasie word vir WTW 732 vereis

**Kontaktyd** 1 lesing per week

**Onderrigtaal** Module word in Engels aangebied

**Akademiese organisasie** Wiskunde en Toegepaste Wisk

**Aanbiedingstydperk** Jaar

## Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

An introduction to Markowitz portfolio theory and the capital asset pricing model. Analysis of the deficiencies in these methods. \*Hierdie inligting is slegs in Engels beskikbaar.

Sensitivity based risk management. Standard methods for Value-at-Risk calculations. RiskMetrics, delta-normal methods, Monte Carlo simulations, back and stress testing.

## Stelsel denke 780 (ISE 780)

**Modulekrediete** 16.00

**Diensmodules** Fakulteit Natuur- en Landbouwetenskappe

**Voorvereistes** Geen voorvereistes.



<b>Kontaktyd</b>	20 kontakure per semester
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Ingenieurs- en Tegnologiebest
<b>Aanbiedingstydperk</b>	Semester 1 en Semester 2

#### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

The modern world is made up of “systems”. This is evident from everyday discussions amongst even the general public. Statements such as “The system failed us”, or “The national energy system is under pressure” abound. Unfortunately, most people have little or no understanding what a system is, or how to deal with it. Digging deeper into the concept of “system” leads one to realise that engineers and scientists without any working knowledge of “systems thinking” cannot succeed when attempting to solve complex problems. The module will equip students with the ability to solve problems from a “whole”, “big picture” or holistic perspective. Students will develop a range of critical skills allowing them to successfully function in a complex world made up of many interrelated systems. The module will also provide students with an overview of systems engineering resulting from systems thinking, including the requisite tools and processes. This module will challenge much about a students’ work environment, but it also will be unlike any other module a student has ever completed, mostly presented independent of any traditional engineering discipline.

### Eindige-elementmetode 763 (WTW 763)

<b>Modulekrediete</b>	15.00
<b>Voorvereistes</b>	WTW 733 word ten sterkste aanbeveel
<b>Kontaktyd</b>	2 lesings per week
<b>Onderrigtaal</b>	Module word in Engels aangebied
<b>Akademiese organisasie</b>	Wiskunde en Toegepaste Wisk
<b>Aanbiedingstydperk</b>	Semester 2

#### Module-inhoud

\*Hierdie inligting is slegs in Engels beskikbaar.

An analysis as well as an implementation (including computer programs) of methods is covered. Introduction to the theory of Sobolev spaces. Variational and weak formulation of elliptic, parabolic, hyperbolic and eigenvalue problems. Finite element approximation of problems in variational form, interpolation theory in Sobolev spaces, convergence and error estimates.

### Main principles of analysis in application 735 (WTW 735)

<b>Modulekrediete</b>	15.00
<b>Voorvereistes</b>	Calculus at 2nd-year level (eg WTW 218) and one 3rd-year level module on analysis or applications of analysis (eg WTW 310, WTW 382, WTW 383 or WTW 386)
<b>Kontaktyd</b>	2 lesings per week
<b>Onderrigtaal</b>	Module word in Engels aangebied



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**Akademiese organisasie** Wiskunde en Toegepaste Wisk

**Aanbiedingstydperk** Semester 1

**Module-inhoud**

\*Hierdie inligting is slegs in Engels beskikbaar.

Study of main principles of analysis in the context of their applications to modelling, differential equations and numerical computation. Specific principles to be considered are those related to mathematical biology, continuum mechanics and mathematical physics as presented in the modules WTW 772, WTW 787 and WTW 776, respectively.

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Die inligting wat hier verskyn, is onderhewig aan verandering en kan na die publikasie van hierdie inligting gewysig word.. Die [Algemene Regulasies \(G Regulasies\)](#) is op alle fakulteite van die Universiteit van Pretoria van toepassing. Dit word vereis dat elke student volkome vertrou met hierdie regulasies sowel as met die inligting vervat in die [Algemene Reëls](#) sal wees. Onkunde betreffende hierdie regulasies en reëls sal nie as 'n verskoning by oortreding daarvan aangebied kan word nie.